SOME POINTS IN THE DIAGNOSIS
OF
MEASLES AND GERMAN MEASLES.

Thesis for the degree of M.D.

by

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SOME POINTS IN THE DIAGNOSIS

of

MEASLES AND GERMAN MEASLES.

Whilst acting as Resident at the Edinburgh City Hospital in the Spring and Summer of 1909, several cases of German Measles were admitted under my care. As they came from widely different parts of the city it looked as if an Epidemic might be expected. The conjecture proved to be a true one and as the diagnosis of German Measles in a large proportion of cases is by no means an easy matter, I thought that perhaps some help might be obtained on the subject by an examination of several points regarding which there still seems to be some considerable doubt and uncertainty. These include the number and condition of the leucocytes during the time of the rash, the presence or absence of Itching, Desquamation or Pigmentation of the skin and the reaction of the urine to Erlichs Diazo Test.

To give some idea of the difficulty in recognising the disease, I have given the practitioners' diagnosis of 100 cases.

30 were diagnosed as German Measles.
56 " " " Measles.
10 " " " Scarlet Fever.
3 " " " Observation Scarlet.
1 " " " Scarlet Fever or Measles.

I was able to get notes on 150 cases and managed to obtain 120 leucocyte counts and differential films, in about 50 cases. As a contrast I was also able to take notes on 50 cases of Measles, and to get about 40 leucocyte counts and films.

The great majority of the counts were taken during the time of the rash. Several were taken at later stages and a few in the premonitory period.

CONDITION OF THE LEUCOCYTES IN GERMAN MEASLES.

As regards the blood in German Measles very little information on that subject is to be found except a single reference in Nothnagael's Encyclopaedia to the effect that Cabot - "found no changes in the blood on two occasions."

In the medical text books such as Osler, etc. and in various works on infectious disease such as Albutt, Nothnagael, etc., it is always stated that there is a "Leukopenia" in Measles. This being so, if there was a leucocytosis in the German variety, then it might be expected to be of some service as an aid to diagnosis. Curiously enough the first few cases showed a fairly high "White count" varying from 12 - 16,000 but shortly afterwards I obtained some low counts of 5000 - 6000/.

6000. By the time I had taken counts of 48 cases on admission I found that 24 of those or 50 per cent had a leucocytosis, taking 7500 white cells per c.m. as the mormal. The highest count amounted to close on 19,000 per c.m. of the remainder, that is of the other 50 per cent the count only once fell below 5000.

Thus far there did not seem to be some difference between the count in the two diseases, but as half of them gave a leukopenic count such as is said to be the case in measles it did not seem that it could be a reliable test in differentiating between those two diseases.

As regards its usefulness as a test against Scarlet Fever counts, it did not seem to be of great use, for as Dr. J. M. Bowie* pointed out in his paper on the blood in Scarlet Fever, there are many cases of mild scarlet fever, which give no leucocytosis or at most such a slight increase in number, that one would not be justified in founding a diagnosis upon it. Many other conditions he says, such as Tonsillitis and Septic infections, both liable to be confused at times with scarlet, giving just as much. He does not however record any cases below the normal, i.e. 7500, the ordinary count in scarlet varying from 10000 - 25000./

* Diagnosis of Scarlet Fever by Leucocyte Count by J. M. Bowie, M.D.

25000.

Dr. Bowie says also that the differential count ought to be of value. As the Eosinophils follow a fairly definite course they are increased in practically all the cases amounting as a rule from 4 - 12 per cent. The count is otherwise made up chiefly of Polymorphous cells, the increase being both absolute and relative.

DIFFERENTIAL BLOOD COUNT IN GERMAN MEASLES.

In German Measles on the other hand I found the differential blood count to be almost invariably a lymphocyte one both relative and absolute.

One must of course always take into consideration the age of the patient in reckonings of this kind.

Cabot for instance gives the proportions of leucocytes in infants and adults as follows :-

Normal	Differential Blood Count.		
	Polymorphs	Lymphocytes	Eosinophils
Adults	60 - 70	20 - 30	½ - 4
Infants	18 - 40	40 - 60	1 - 6

From Nothnagael's Encyclopaedia of Medicine.

To put it roughly the normal count in an adult is chiefly Polymorphous and in a child Lymphocytic. In my own cases the ages ranged from 3 - 30 or thereabout.

I/

LEUCOCYTE COUNT IN GERMAN MEASLES.

NO.	Age.	White Blood Count	Differential Count Polymorphs	Lymphocytes	MonoNeuclears
1	1½yr	17000	29	40	31
2	2	1st day 13,825 4th " 13,300 10th " 14,000	1st day 38	40	22
3	3	not taken	1st day 31	20	49
4	4	8750	40	39	21
5	4	8750	46	35	19
6	6	10250	46	23	31
7	6	11500	50	26	24
8	6	12,000	32	39	29
9	6	1st 5000 5th 17,000 11th 13,500	39	32	29
10	6	23,000	German and Diphtheria.		
11	6	7,500	56	28	16
12	6	6,500	1st day 47 15th " 49	33 15	20 36
Took Scarlet on 5th day 13	6	1st day 7500 5th " 19,000	1st day 38 5th " 75	45 14	17 11
14	6	1st day 12,500 4th " 9,000 9th " 11,000 12th " 14,000	42	32	26
15	6	7,500	-	-	-
16	6	6,850	-	-	-
17	7	12th day =	35	38	27
18	7	7,500	44	35	21
19	7	13,500	51	8	41
20	7	6,000	44	36	20
21	7-	6,500	40	32	28
22	7	1st day 5,860 8th " 15,000 10th " 11,500	1st day 41 6th " 41	17 17	42 42

LEUCOCYTE COUNT IN GERMAN MEASLES.

No.	Age.	White Blood Count	Differential Count Polymorphs	Lymphocytes	MonoNeuclears.
23	unknown	8,750	34	36	30
24	"	6,500	40	32	28
25	9	10th day	38	32	30
26	11	16,870	42	35	23
27	11	8,750	44	20	36
28	11	7,500 8,200	30	47	23
29	11	10,000	44	23	25. 8 Eosinop
30	12	6,250	47	36	17
31	14	8125	39	19	42
32	13	17,000	1st day 77 5th " 26	21 52	2 22
33	14	9,000	32	28	28. 12 Eos.
34	16	8125	1st day 70 5th " 26	25 47	5 27
35	17	8000	43	43	14
36	17	1st day 3,300 10th " 10,000	1st day 56	19	25
37	18	9275	62	15	23
38	20	16,750	35	40	25
39	20	1st day 6875 5th " 7500 10th " 11,000	33	29	38
40	21	7250	45	25	30
41	21	18,500	51	25	24
42	22	6250	1st day 66 3rd " 53	5 28	29 29
43	22	1st day 10,000 4th " 10,000	1st.day 70 4th " 38	18 20	9 42
44	22	6250	52	17	31

LEUCOCYTE COUNT IN GERMAN MEASLES.

No.	Age.	White Blood Count	Differential Count Polymorphs	Lymphocytes	MonoNeucleats
45	22	5800	34	52	14
46	23	7500	42	32	26
47	25	10,000	33	40	27
48	26	1st day 7500 6th " 10,000 20th " 7500	1st day 58 6th " 70 20th " 55	37 24 28	5 6 7
49	28	5,000 7,500	45	21	34
50	65				
51					
52					

Stained by Jenner's Method

I took altogether 44 differential counts in 44 cases during the time of the rash. In only ten instances was the percentage of lymphocytes below 50 per cent. Four of these ten being under 40 per cent. Moreover in most of the cases which gave a small lymphocyte count, if it was taken, say two or three days afterwards, they almost always then gave a very high lymphocytic count.

To take two cases as an example.
The first case on admission gave a lymphocytic count of 30 per cent. Three days afterwards it was 66 per cent.
Another case gave a count of 34 per cent on admission. Two days afterwards it was 47 per cent.

DURATION OF LYMPHOCYTOSIS IN GERMAN MEASLES.

This lymphocytosis I believe probably lasts some time. In two cases Nos. 17 and 25 the count was still lymphocytic ten and twelve days after the rash.

The EOSINOPHILS in German Measles.

The Eosinophils unlike those in scarlet fever were chiefly conspicuous by their absence I only saw them present on two occasions in counts taken from a brother an sister admitted on the same day.

Although there was no positive evidence of any other cause to which it might be due, I think that the probability/

probability of its being caused by the German Measles germ could very well be discounted.

The MONONEUCLEOSIS of German Measles.

After taking several differential counts I was surprised at the large number of large lymphocytes or mononeuclears that were always present in each field. By that I include both the large round lymphocytes and also the large irregularly shaped cells which take on a similar stain.

With very few exceptions the large cells numbered 20 per cent of the whole count. Moreover if the lymphocytic count was not large, say about 35 per cent this large percentage of mononeuclears could be found to be present.

PERCENTAGE OF LYMPHOCYTES.

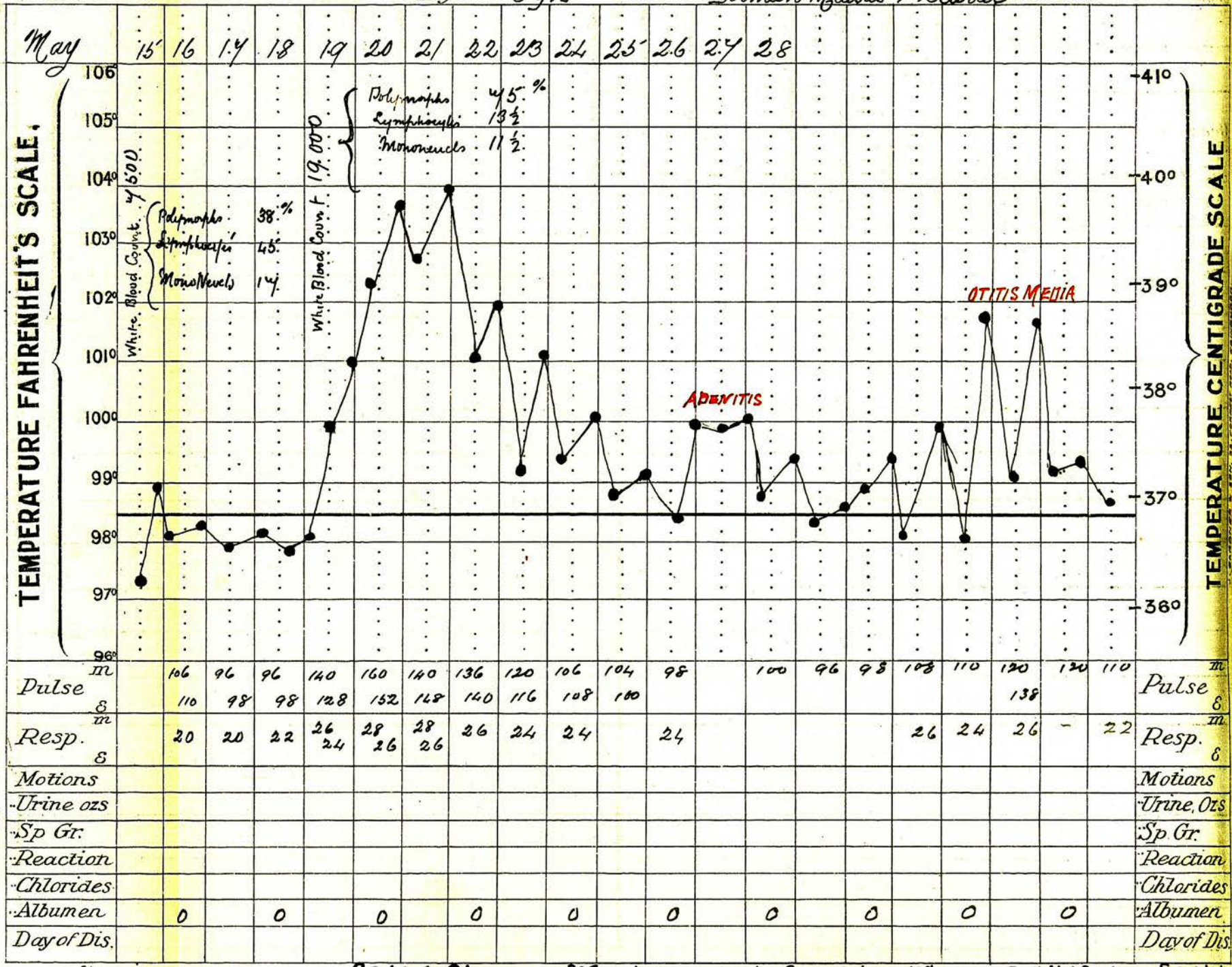
In a total of 46 cases the average differential count on admission, works out at :-

Lymphocytes	55%	Small variety	30
		Large variety	25
Polymorphs	45%		

Of the 55 per cent of lymphocytes, 25 per cent was composed of mononeuclears. This is undoubtedly a strong diagnostic point.

This condition of the blood can I think be of some service in diagnosing between a case of German Measles/

Name Age 6 yrs Disease German Measles + Scarlet Result



	15	16	17	18	19	20	21	22	23	24	25	26	27	28								
Pulse m		106	96	96	140	160	140	136	120	106	104	98		100	96	98	108	110	120	120	110	Pulse m
Pulse s		110	98	98	128	152	148	140	116	108	100								138			Pulse s
Resp. m		20	20	22	26	28	28	26	24	24		24					26	24	26	-	22	Resp. m
Resp. s					24	26	26															Resp. s
Motions																						Motions
Urine ozs																						Urine, Ozs
Sp Gr.																						Sp Gr.
Reaction																						Reaction
Chlorides																						Chlorides
Albumen		0		0		0		0		0		0		0		0		0		0		Albumen
Day of Dis.																						Day of Dis.

Showing Blood Counts

– Case of German Measles developing Scarlet on 5th day. – "Notified as Scarlet"

Measles and Scarlet Fever, the latter in its mild form especially. To take for instance, Case No. 13. A patient was sent into Hospital at night by a medical man, with the diagnosis of Scarlet Fever. The rash which was disappearing looked more like that of a faded German type. The pulse was 106 and the temperature normal. But as his tongue looked like that of a typical scarlet tongue and as he had a history of vomiting and headache it was thought safer to put him in the scarlet ward.

On taking a leucocyte count and a blood film, I found that he had no leucocytosis. His count was normal, just 7500, while the film showed that he had not a polymorph count as one would have expected in Scarlet Fever, but one chiefly composed of lymphocytes, there being 62 per cent of the latter and only 38 of polymorphs. 17% of the lymphocytes were of the large or mononeuclear type.

On this account and as his tongue showed no signs of cleaning up in the usual fashion, he was removed to a sideward next morning. But on the fifth day after admission his temperature began to rise until it reached 104, and his pulse from 98 increased to 160. His body was covered with a typical scarlet rash and it was quite/

had
quite clear that he contracted the disease.

I then took a count and film and found them quite different. His count instead of being a normal one, now amounted to 19,000 and the film was typically that of Scarlet Fever. The polymorphs now numbering 75 per cent; the lymphocytes 25 per cent, 11% being of the large type.

This case illustrates the danger of a too rapid diagnosis when a patient is being sent into a fever hospital. If he had been kept at home, he would have been all right in a few days. As it was he had a very narrow run for his life. The case was just on the verge of being Toxic Scarlet, which as is well known is unfortunately as yet, practically hopeless from the beginning.

Both tympanic membranes perforated so, that he will be permanently crippled to some extent for the remainder of his life.

The next question is, does this lymphocyte count hold good in the case of German Measles only, or do we get it also in Measles? Well as a rule I think it is not nearly so well marked but I will refer to it further on.

THE GERMAN COUNT IN THE CONVALESCENT STAGE.

As to the count in the convalescent stage I have already/

Chart No 2

Name

Age 5 yrs Disease Measles + German Measles Result

April 1909 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24

TEMPERATURE FAHRENHEIT'S SCALE. 106° 105° 104° 103° 102° 101° 100° 99° 98° 97° 96°

TEMPERATURE CENTIGRADE SCALE 41° 40° 39° 38° 37° 36°

White Blood Count 34.250 — 25.000 cells

On 4th: Polymorphs 56 / Lymphocytes 38 / Mono Neucleass 6%

White Blood Count 11.000 — Polymorphs 49 / Lymphocytes 45 / Mono Neucleass 6

White Blood Count 13.42 — Polymorphs 35 / Lymphocytes 45 / Mono Neucleass 21

German Measles

RASH

Pulse m	160	142	120	128	128	120	100	114	100	98	92											Pulse m
Pulse e	140	120	122	120	120	110	116	100	100	92	98											Pulse e
Resp. m	30	36	30	38	34	26	24	24	24	24	24											Resp. m
Resp. e	32	40	32	36	28	26																Resp. e
Motions																						Motions
Urine ozs																						Urine, Ozs
Sp Gr.																						Sp. Gr.
Reaction																						Reaction
Chlorides																						Chlorides
Albumen																						Albumen
Day of Dis.																						Day of Dis.

MEASLES with High Blood Count

Developed German Measles 18 days after admission { was in contact with a German Case when admitted

already mentioned that the lymphocytes are still to be found in practically the same proportions at the end of a fortnight as at the beginning of the disease, but the absolute number varies. As a rule if the count is a small one at the beginning, it mounts up fairly rapidly (Cases 9, 22 and 36) and then gradually comes down again. But if the count is a moderately high one (Cases 2 and 43) it may remain at the same level all through, or there may be a slight drop and then a rise again as in Case 14.

The count seems to reach high water mark about the tenth - the fourteenth day after the invasion stage.

INCUBATION STAGE OF GERMAN.

In only one case was I able to obtain a count in this stage. It happened that a case of measles whose blood count I managed to take on several occasions during her convalescence developed German Measles a day or two after one of those counts. At that time it amounted to 10,000 per c.m., but on the appearance of the rash it had risen to 13,000.

CONCLUSIONS REGARDING BLOOD IN GERMAN MEASLES.

I. The count in the incubation and prodromal stages is unknown.

2. During the Period of Rash.

There may be a leukopenia or there may be a moderate/

moderate leucocytosis. The count never seems to exceed 20,000 at the most and rarely falls lower than 6000.

The red cells are unaltered. The lymphocytes are in the majority, mostly averaging 60 per cent of the whole cells. The polymorph cells are in the minority averaging about 40 per cent.

The Eosinphil cells are absent.

There is a mononeucleosis or great increase in the number of large lymphocytes average 25% of the total count.

Other diseases with a Mononeucleosis -

Lymphatic Leukaemia.

Malignant Sarcoma.

occasionally
(a few cases of) Measles.

THE BLOOD IN MEASLES.

In Nothnagael's Encyclopaedia there is a review of the literature on this subject, and as I happen to differ in a good many points from the conclusions reached, I had perhaps better give a short summary of the various views expressed. That of A. Renaud is the one on which most reliance is evidently placed. His views summed up as briefly as possible are :-

(1). That during the period of incubation, starting from/

from the beginning, there is a progressive Hyper-leucocytosis which reaches the maximum six days before the appearance of the eruption.

(2) That this increase is due to polymorph cells and (3) that the count then falls until there is a well marked leukopenia at the time of the rash.

(4.) During the time of the exanthem there is a diminution of the polymorph cells and a relative increase in the lymphocytes, but in measles already complicated or about to be complicated by other diseases this diminution does not exist.

(5). This diminution of the leucocytes reaches its maximum twenty-four hours after the appearance of the eruption. At this time he says they are reduced to half the usual number, i.e., 3500 - 4500 due chiefly to a decrease in the polymorphs.

(6). After this the count rises gradually until it reaches the normal on or about the sixth day, provided there are no complications. If there are it rises at once and is due to the increase in polymorphs.

(7). He considers that the leukopenia in the catarrhal and predromal stages is an aid in diagnosis.

(8). As regards prognosis. During the eruption period if the count goes very low and continues long, it is of unfavourable import. That which is slight

and/

and changes rapidly to an increased count is due to some complication.

Cabot states that the blood count is of value in excluding Scarlet and Diphtheria and Syphilitic Roseola, all of which show a leucocytosis.

Ewing 1901 in the Clinical Pathology of the Blood says that the red cells in measles suffer little or no change, that in adults Measles is never accompanied by leucocytosis but by Hypo-leucocytosis reaching in one case 2700. As a rule he says it is between 4000 - 6000.

Proportions of the WHITE CELLS present.

Turk found a polyneuclear count during the stage of fever, with diminution of small lymphocytes.

Pee, Klein and Turk noticed an increase of mononeuclears. Eosins are stated to be diminished, yet Turk found 5% in the second week.

Unfortunately owing to lack of time I was unable to take observations on the blood in more than nineteen cases of measles. From these I obtained altogether twenty-nine white counts and thirteen differential counts.

Regarding the first of Renaud's statements that there is an hyper-leucocytosis during the earlier part/

part of the incubation stage. I have no opinion to offer, but I am unable to confirm his second statement that from the sixth day previous to the appearance of the exanthem the count falls rapidly until the rash appears. Though only able to get counts in the invasion stage in two cases both did not have a falling count but showed a gradual rise.

The first case No. 18, had a count of 6875 per c.m. two days previous to the rash. The next day it had risen to 7500. The rash appeared on the next day and I took no count but the day afterwards it had risen to 10,000.

Case 19 was of a similar description, the count being 8000, three days previous to the appearance of the rash, and on the day of the rash it was 11,000.

Then as regards the third statement that there is a leukopenia which is most marked at the appearance of the eruption and a precisely similar statement may be found in any text book on Medicine.

I am very much inclined to doubt its accuracy. In the nineteen cases of which I have a record the greater number certainly had a diminished count ranging from 5000 - 7000 but in seven cases the count lay between 10,000 - 18,000 and in one case it was/

was actually as high as 37,000. This latter case however had been admitted from the Sick Children's Hospital where it had been sent for what appeared at the time to be simply a series of Epileptic convulsion. The rash however came out several hours afterwards and the patient was immediately removed to the Fever Hospital.

When I examined her she had some slight dullness accompanied by coarse crepitations at the lower and anterior part of the right lung, so that possibly the Catarrhal Pneumonia might account for the high count. This case also showed a peculiarity sometimes noted in the Exanthemata, i.e., that the rash was entirely confined to the face and limbs, owing to some sympathetic nervous reaction from the corresponding Splanchnic Area - "in this case the lungs".

See Chart N°2 page

But of the other counts which were higher than is supposed to be the case in Measles there was no such reason apparent to which it could be attributed. From these facts, few as they are, it seems to me to be wrong to state dogmatically that there is always a leukopenia in cases of uncomplicated measles at the time of the rash.

Then as regards the fourth statement that the polymorphs are reduced during the stage of fever and/

Name _____ Age 5 yrs Disease Measles Result Died

+ Broncho Pneumonia

June 1909 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18

TEMPERATURE FAHRENHEIT'S SCALE, 106° 105° 104° 103° 102° 101° 100° 99° 98° 97° 96°

TEMPERATURE CENTIGRADE SCALE 41° 40° 39° 38° 37° 36°

6000 White Blood Count

8000 " "

8500 " "

on 9th

Polymorpho 63 %
Lymphocytes 33 %
Mononeuclears 4 %

10.000 " "

" "

Died

Pulse m	146	168	172	160	160	160	176	168	176	160	Pulse m
Pulse e		160	120	120	142	164	180	168	190	180	Pulse e
Resp. m	68	46	42	68	64	68	80	62	82	46	Resp. m
Resp. e		56	48	62	62	78	82	84	90	70	Resp. e
Motions											Motions
Urine ozs.											Urine, Ozs
Sp Gr.											Sp. Gr.
Reaction					+						Reaction
Chlorides											Chlorides
Albumen											Albumen
Day of Dis.											Day of Dis.

+ = Diazo Reaction

Fatal Case of Measles showing small White Blood Count

and that the lymphocytes are in the majority, he certainly differs widely from Turk who says exactly the opposite condition is to be expected, viz., a great increase in the polymorphs. No mention is given of the number of counts taken . I myself took thirteen differential counts on twelve cases with the result that I am unable to agree with either of them. First because although in the majority there was a reduction of the polymorphous type of leucocyte. Yet the reduction was not large enough to allow the lymphocytes to form the majority and secondly because the polymorphs were never in greater proportions than can be obtained in a normal count.

In a good many cases the count was practically normal. In the others there was a varying reduction of the polymorph variety.

Averagge of 12 cases.

Polymorphs	57%
Lymphocytes	43%

Type of LYMPHOCYTES in MEASLES.

In five out of the twelve cases there was an increase of the large or mononeuclear variety of lymphocytes.

INFLUENCE OF COMPLICATIONS IN MEASLES.

The/

LEUCOCYTE COUNT IN MEASLES.

	No.	Age	White Blood Count	Differential Count. Polymorphs	Lymphocytes	Mononeuclears
	1	3	15,000	-	-	-
	2	4	10,250			
	3	4	7,000	56	31	11 E. 2
	4	5	1st day 37,000 2nd " 25,000 13th " 11,000	1st 56 13th 49	38 45	6 6
	5	5	6,875	49	42	9
	6	5	7,000	-	-	-
	7	5	7,000	-	-	-
Died	8	5	1st day 6,000 2nd " 8,000 4th " 8,500 6th " 10,000	1st 68	33	4
	9	5-10	18,125 12,000 11,000	60	32	8
	10	5-10	7,000	72	26	2
	11	5-10	8,000	70	5	25
	12	5-10	12,500	63	33	4
	13	5-10	5,000	-	-	-
	14	5-10	10,500	46	39	15
	15	5-10	10,000	1 -	-	-
	16		6,250	54 52	23 40	23 8
	17		5,700	38	23	39
			Aver. 57	L 43		
			COUNTS IN PRODROMAL STAGES.			
Died	18		6,875 7,500 Rash 10,000	2 days previous to rash 1 " " " " Rash 1 day after rash		
	19		8125 11,000	3 days previous to rash day on which rash appeared		

Name

Age 4 years Disease Measles Result Died

1909 June	6	7	8	9	10	11	12	13	14	15	16	17	18
Pulse m	136	140	148	120	144	140	152	150	144	148	160	180	
Pulse e	140		138	132	136	132	148	156	164	180	176	160	
Resp. m	26	36	36	32	48	52	84	82	84	80	62	64	
Resp. e	36		44	34	32	30	62	64	82	82	80	64	
Motions													
Urine ozs													
Sp Gr.													
Reaction								0	No Specimen obtained				
Chlorides													
Albumen													
Day of Dis.													

TEMPERATURE FAHRENHEIT'S SCALE, 106° 105° 104° 103° 102° 101° 100° 99° 98° 97° 96°

TEMPERATURE CENTIGRADE SCALE 41° 40° 39° 38° 37° 36°

Broncho-Pneumonia

White Blood Count 6845

ditto 45000

RASH

White Blood Count 10000

Died

Fatal Case of Measles showing small White Count

The only other two cases which had complications were Nos. 8 and 18. Broncho-Pneumonia supervening in both those cases and unfortunately both terminated fatally.

As Reverdin says, a count which is small and does not increase quickly at the onset of a complication is of very favourable import. That was certainly so in both of those cases. Both the counts were small at the onset and (~~on~~ shortly before) the day of death) had only risen to 10,000 in the one and 11,000 in the other.

I would also like to point out that in cases with a high count including No. 4, the increase was chiefly due to a relative and absolute increase in the number of lymphocytes.

Erlichs Diazo Reaction in MEASLES and GERMAN MEASLES.

That Erlichs reaction is present is well known, but some doubt seems to exist as to what proportion of cases are liable to give the reaction in German Measles. Hutchinson and Rainy in Clinical Methods, page 380, Erd Edition.

I was able to get the urine tested in 150 cases of German.M% The result was that in only one case was the reaction positive. It was also obtained in/

in one case complicated by whooping cough. But the reaction has been obtained in whooping cough alone, so that I think it may be left out of count altogether and in another case the reaction was not quite definite.

Probably if a larger number of cases were tried, 2% would be found to be a liberal estimate.

This contrasts strongly with the percentage of positive reactions obtained in measles. In fifty cases of measles I obtained ~~two~~ positive reactions in 49 cases or 98 per cent and in a 100 cases of Scarlet Fever under my care 45 gave the reaction.

Results of Diazo Reaction.

Diseases Number	of cases tested	Reaction Positive.
German Measles	150	1 %
Measles	50	98 %
Scarlet Fever	100	45 %

* The reaction is obtained when the rash is beginning to fade.

In performing the test one must be careful to always use the same size of test tube otherwise the various proportions may be altered and a negative result obtained.

PREMONITORY SYMPTOMS IN GERMAN MEASLES.

This part of the subject although practically no attention is bestowed upon it is still not without some little importance.

If a medical man is called to a patient and gets a history of headache, sore throat and vomiting accompanied by fever and a resemblance to that of Scarlet Fever, one might say that he was quite justified in diagnosing it as such, and yet all those symptoms can be found in German Measles. Vomiting for instance, supposed to be one of the cardinal symptoms of Scarletina and never present in German Measles, for I never saw it mentioned in any book or article on the subject, was present in 10 per cent of my own cases. Regarding the other premonitory symptoms I took notes on them and give the average of each.

Enlarged Glands	=	95 %
Sneezing, Coughing and Catarrh	=	50 - 75 %
Headache	=	25 %
Sore Throat	=	15 %
General Malaise	=	12 %
Stiff neck	=	10 %
Vomiting	=	10 %

Vomiting	=	10 %
Pain in the Back	=	4 %
No Symptoms	=	6 %

The enlargement of glands is seen to be the commonest symptom but it is often present in measles and many children have glands in the neck, axilla and Groin due to other causes.

The cases in which the glands were scarce or absent almost invariably complained of pain or stiffness in the neck or back.

Six per cent were able to give a clear history of never having symptoms of any kind. The presence of a rash giving them quite a surprise.

LENGTH OF INVASION PERIOD IN GERMAN MEASLES.

Nothnagael on premonitory symptoms, says they may be wholly lacking, yet cases have been known where they were present four days before.

This I also found to be the case. While a few had no symptoms, the others had, the average length of the invasion period being 12 - 24 hours. A few had an invasion period of two - three days, while three cases gave a clear history of illness dating from four days before the appearance of the eruption.

The/

The following is the history of such a case. E. M. A female, twenty-two years of age, was admitted on 4th April with a temperature of 102 and pulse 136, complaining of stiffness and pain in the neck accompanied by nasal catarrh and a profuse papulo macular pink rash all over the body.

The history was that on March 31st she had a headache and felt tired and out of sorts. Then for the next two days she felt better. But on 3rd April noticed that she was sneezing a lot and at night she turned sick and vomited and on undressing noticed the rash.

TEMPERATURE IN GERMAN MEASLES.

In Nothnagael it is stated that there is often no temperature during the disease and he quotes Von Nymann as saying that of 119 cases, 53 had no elevation and 61 had cases with a temperature of 104^F are on record but are supposed to have been due to some such complication as Pneumonia.

Von Nyman 's

53	cases	with	temperature	normal.
39	"	"	"	100.4
14	"	"	"	101.3
6	"	"	"	102.2
2	"	"	"	103.1

Name | Age 2 yrs | Disease Measles | Result

TEMPERATURE FAHRENHEIT'S SCALE.

106° 105° 104° 103° 102° 101° 100° 99° 98° 97° 96°

RASH

TEMPERATURE CENTIGRADE SCALE

41° 40° 39° 38° 37° 36°

| | | |

I have notes of the temperature in 100 cases and they are somewhat similar.

25	cases	with	a	temperature	of	98 - 99
40	"	"	"	"	"	99 - 100
25	"	"	"	"	"	100 - 101
5	"	"	"	"	"	101 - 103
3	"	"	"	"	"	102 - 103
2	"	"	"	"	"	103 -

90 % were below 101.

The higher the temperature the more profuse is the rash and coincidentally the throat symptoms are more severe. In only one case was there distinct patching.

TEMPERATURE IN MEASLES.

Measles without temperature is said to be rare. In one of my own cases the temperature during the time of the rash and on the previous day was never above 99^{F}.

THE RASH IN GERMAN MEASLES.

While I have no desire to enter into a description of the rash or rashes seen in German Measles as an adequate description would require a volume accompanied by a collection of photographs taken by the new three colour process, a closed book to most at/

at present for various reasons. I would like to give notes on a few points.

That the rash may be quite sufficient by its appearance alone to settle the diagnosis in some cases, but that in others it is quite impossible to distinguish it from that of Measles and Scarlet Fever. Some of the cases I saw would I am sure defy any expert.

In those cases the diagnosis can only be made clear by reference to various other points such as blood counts, reaction of the urine, etc.

That the rash may either be macular or not perceptibly raised above the skin or that it may be papular and quite easily felt.

That, in these cases in which the rash is composed of numerous evenly distributed pink minute papules and macules, when the rash has disappeared, leaving the skin normal. In some cases after a varying interval from 6 - 36 hours a very fine pink flush appears chiefly on the arms and chest. In one case it was visible for almost a week. The flush is very delicate in colour and fades distinctly on pressure. Anything causing a rush of blood to the skin such as a hot drink renders it much more noticeable.

I/

I saw a case admitted after the rash had disappeared and with no other symptoms whatsoever. However this flush was quite easily seen the next day and clinched the diagnosis.

Then the rash is like that of smallpox in that it is always more profuse in parts of the body exposed to pressure. The buttocks, shoulder blades, posterior aspect of the elbow joints, etc. while close fitting articles of dress such as garters may leave their imprint in the shape of well marked rash rings.

DESQUAMATION & STAINING OF THE SKIN.

In only six out of 100 cases was there definite desquamation, only profuse in one case. In the others it was local being confined to the hands and feet. I never saw any of the fine bramy desquamation that is referred to in the text books, but as each patient had a warm bath every second day that would probably remove all traces of it. The case in which the desquamation was profuse did not bear any resemblance to Duke's celebrated Fourth Disease except that the rash took on the Scarlet like appearance on the second and third day. Before that it was definitely papulo macular in type. The temperature was not high in

100/

100 and the blood count was small and showed a preponderance of lymphocytes, large and small.

STAINING OF THE SKIN.

In no case was there any pigmentation of the skin after the disappearance of the rash. This is a very valuable confirmatory diagnostic sign. Measles cases showing staining in most cases to a greater or less extent.

ITCHING OF THE SKIN.

In two cases patients complained of itching when the rash was at its height, but only for a time.

CONCLUSIONS.

I. That German Measles during the period of the rash and for some considerable time afterwards can be diagnosed from Scarlet Fever by the condition of the leucocytes. The conditions being that in Scarlet Fever there is a more or less marked leucocytosis due to an increase in the polymorphous cells and an increase of Eosinophils.

II. That on the other hand in German Measles while the count may be as high in numbers as that of Scarlet Fever yet it can be easily differentiated from it owing to the large number of lymphocytes present, to the absence of Eosinophils and to the presence of a mononeucleosis or great increase in the number of mononeuclears or large lymphocytes.

III. That the tongue never feels or cleans up in German Measles as it does in Scarlet.

IV. That the blood in Measles seems to lie halfway between those two types now preponderating to the one side and now to the other.

V. That the statement that there is always a leucopenia in uncomplicated Measles is not correct.

VI. That if the diagnosis is at all dubious as to whether it is German or true Measles that it can be practically/

practically settled by Erlichs Diazo Reaction, it being positive in measles and negative in 98 % of cases of German Measles. While the probability is that if the case does give a positive reaction, that it will be so typical of Rubella, that there could be no mistake in diagnosis. "This test of course cannot be used until the second and third day."

VII. That as a confirmatory test the entire absence of pigmentation of the skin in German Measles is of value.